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Orenburg, which seems to have been the limit of his knowledge.* It seems likely that the Greek traders of Olbia kept up a communication so far in a regular and systematic manner. Herodotus speaks of the Scythians who made the journey to the extreme tribe which he mentions, transacting business in seven languages and by means of seven interpreters (chap. 24). But, except in this direction, his knowledge seems to be vague; and of the coast of the Maeotis in particular he says nothing, except that it was occupied by the Royal Scythians.

III.—*On the Physical Structure and Arrangement of the Islands of the Indian Archipelago.* By Mr. W. EARLE.

A TRAVELLER in the Indian Archipelago soon perceives that there is an essential difference in the structure of the various islands. Some are only moderately elevated, with the land sloping gently towards the shore, and having regular soundings far out to sea. Others again rise abruptly from an unfathomable depth, and contain lofty mountains, some of which are active volcanoes; while a third class, comprising some of the larger islands, as Sumatra and Borneo, are of a mixed character, partaking in part of the peculiarities of both the others, the limits, however, of the two formations being very distinctly defined. The object of this paper is to point out an arrangement which will present at one view the character of the different islands. This arrangement has suggested itself to me during a personal acquaintance with the Indian Archipelago extending over a period of several years, and I feel that, had it previously existed, it would have very materially assisted me in pursuing the inquiries that I have lately had occasion to make in that part of the world.

The contrast which the volcanic islands of the Archipelago afford when compared with the continent of Australia is very strikingly presented to the view of a voyager from Port Essington, crossing for the first time the sea that separates the continents of Asia and Australia. Even before he has lost soundings on the great bank which extends from the northern shores of the latter continent, the lofty mountains of Timor rise up before him. As he nears the land the colour of the water suddenly changes from green to a deep blue; he has now passed the steep edge of the bank, and is floating on the unfathomable seas which bound the

* This has been shown, in opposition to the views of Heeren, by Mr. F. W. Newman, in a paper read to the Philological Society, March 24, 1843. (*Proceedings*, vol. i., No. 7.)



volcanic islands of the Archipelago. On closer examination, he finds that the land of Timor rises abruptly from the depths of the ocean, so much so, that from many of the precipices which overhang the sea, a line of great length will not reach the bottom, while the very few spots on which anchorage is to be found are so close to the shore as to be available only when the wind blows from the land. And to complete the contrast, if the weather is clear we perceive that one of the mountains near the east end of Timor is an active volcano. The chain of islands which extends from Java to Timor is of the same character; lofty volcanic peaks, some in a state of activity; while the islands are separated from each other by narrow channels of unfathomable depth, through which the current from the Pacific, caused by the prevalence of easterly winds, rushes with great force; but on passing these the voyager again perceives a change in the colour of the sea from deep blue to green, and, on sounding, he finds a bottom of stiff clayey mud, resembling exactly that of the bank which fronts the northern coasts of Australia; he is now on the great bank which extends from the south-eastern extremity of Asia far into the seas of the Indian Archipelago. The islands now lose their volcanic character, and on arriving at Singapore, near the extremity of the Malay Peninsula, the general resemblance of the country to that in the neighbourhood of Port Essington is sufficient to strike the most careless observer. The land low and undulating; the shore with red cliffs alternating with sandy beaches; even the rocks of the red iron-stone known to Indian geologists by the name of *laterite*, are perfectly in character with the country of the Cobourg Peninsula, and even on closer examination little difference can be discovered except in the vegetation.

These banks of soundings which extend from the continents of Asia and Australia form very remarkable features in the geography of this part of the world, and, as such, are deserving of more attention than has hitherto been bestowed upon them, since it will be found that all the countries lying upon these banks partake of the character of the continents to which they are attached; while those which are situated on the deep sea which separates them are all of comparatively recent volcanic formation, with the exception of a few small coral islands, which, in all probability, are constructed upon the summits of submerged volcanoes.* The depth of water on these banks averages about 30 fathoms, deepening rapidly as the edge is approached, and shoaling gradually towards the land. It will be seen that the one I have termed the Great Asiatic Bank extends into the Archipelago from the south-eastern

* See Darwin.

extreme of Asia to a distance of nearly 1000 miles, in fact to within 50 miles of Celebes, and I strongly suspect that it will be found to extend to the south-western extremity of that island also; but as there is a space of nearly 30 miles across which no soundings have been carried, I have preferred reducing the bank to the limits for which we have actual data.

Countries lying on the Great Asiatic Bank.—The similarity that exists in the direction of the mountain ranges in the south-eastern part of Asia has often been the subject of remark. These invariably run in a direction nearly N.N.W. and S.S.E., and are all of the primary formation. The chain which extends along the Malay Peninsula is the most conspicuous of these ranges, and is continued at intervals to Banca and Billiton, and perhaps may be traced as far as the north coast of Java. It is this range that most abounds in metals, or, at all events, in which mining operations are pursued with greatest success, probably from the strata, owing to its central position, having been little disturbed by the convulsions which have shaken the countries on either hand. The productiveness of the gold mines of the Malay Peninsula and of the tin mines of Banca is well known. This range may be considered as the back-bone of the Great Asiatic Bank. Sumatra, which lies on its western verge, has been subjected to volcanic action, but not to so great an extent as to disturb the direction of its mountain range, which runs parallel to that of the Malay Peninsula. The third and last range that can be traced into the Indian Archipelago is the one that traverses Laos and Camboja, at the southern extremity of which it disappears for a time, showing itself only at Pulo Condor and the Natunas, until it emerges near the north-west extreme of Borneo, and is continued along the entire west coast of that island. Here it again disappears, and only shows itself again on the north coast of Java, where it ceases entirely; the remaining portion of this island, with, perhaps, a part of the north-west extremity, being either of volcanic formation or of alluvial deposit. It is rather singular that the celebrated teak-tree, which abounds on the Cambojan part of this range, but is not found in Borneo, is again met with here, the projecting part of the north side of Java, between Samarang and Surabaya, being a vast teak forest, from the timber of which the greater portion of the shipping employed in the Archipelago is constructed. Java is the only island in the eastern seas in which the teak-tree is indigenous, nor will it thrive in the volcanic parts of the island where its cultivation has been attempted. This, which we may call the Cambojan Range, is also rich in minerals, especially the Bornean part of it, where large quantities of gold and many diamonds are obtained by the miners. The volcanic islands of the Archipelago also contain

metals, gold-dust being found at the bottoms of many of the mountain streams, but it does not exist in *veins*, as in the Malayan Peninsula and on the west coast of Borneo, these having apparently been broken up by the violent convulsions to which these islands have been subjected. The metal is therefore only obtained from the bottoms of the mountain streams, where it has been deposited when the earth in which it was contained was washed away.

Volcanic Islands of the Indian Archipelago.—The lines of volcanic action to which these islands have been subjected can be traced with tolerable distinctness. One of these extends along the W. coast of Sumatra and the S. coast of Java, whence it is continued by a chain of islands separated by narrow but deep channels to New Guinea, and can be traced through that island to the Louisiade Archipelago, and is probably continued by New Caledonia and Norfolk Island to New Zealand, thus forming a curved line resembling the letter S. The other line commences in Kamtschatca and extends through the Kurile Islands, Japan, and Laochoo, to the Philippines, where it separates into two branches, one traversing Palawan and the N.W. part of Borneo, where it terminates near the limits of the Great Asiatic Bank, and the other continuing in a southerly direction until it comes in contact with the Sumatran line. It is near this point of contact that the volcanic action has been strongest, throwing the islands into fantastic forms, of which Celebes and Gillolo furnish striking examples. These islands all rise abruptly from an unfathomable sea, a circumstance unfavourable to their productiveness, since a large portion of the rich soil created by the decomposition of the volcanic rock is washed away into the ocean. Java, however, is in a great measure exempt from this disadvantage, owing to the Great Asiatic Bank extending to its northern coast, which prevents this soil from being lost, in lieu of which it is deposited in vast plains lying between the mountain range and the sea. These plains are so surpassingly rich, that they not only yield a sufficiency of grain for the consumption of a large portion of the population of the Archipelago, but at the same time afford such abundance of sugar and other tropical produce as to furnish cargoes for many thousand tons of shipping.

The Great Australian Bank.—The remark that has been made with regard to the ranges in the south-eastern part of Asia is equally applicable to Australia, since one of the most marked features in the geography of this continent is the uniformity that exists in the direction followed by all the continuous mountain ranges that have yet been discovered. The Darling range on the W. coast of Australia, the great chain that extends along the N.E. coast, with the range that traverses a portion of South Australia,

and in which metallic ores have lately been found in such abundance, pursue a direction nearly N.N.W. and S.S.E.; and although the ranges on the E. coast of New South Wales vary somewhat upon this point, it is still to so slight a degree as not to require any particular remark. That this rule is also applicable to the lesser ranges is proved, at least as far as the shores are concerned, by all the deep inlets on the coasts of Australia preserving the same general direction, that is, running parallel to the mountain ranges; indeed so generally is this the case, that there is scarcely even a deep bay throughout the entire coast that does not conform to the general rule. The same occurs in Van Diemen's Land; indeed this island must be considered as being a portion of Australia, for, although really insular, being surrounded by water, it is still joined to the continent by a bank of soundings on which there is a depth of from 35 to 40 fathoms.

The great bank which fronts the N. and N.W. coasts of Australia commences near the N.W. cape, and extends in a N.E. direction to New Guinea, where it terminates at the base of the high but narrow mountain range that unites the eastern and western parts of that island, and separates the Banda Sea from the Great Pacific. It is at this point that the edge of the bank is most remote from Australia, the distance to the nearest point of the N. coast being 400 miles. It appears again on the S. coast of New Guinea, near Torres Straits, and extends along the N.E. coast of Australia, the Great Barrier Reefs being on its outer edge.

The Arru islands and New Guinea are thus united to the continent of Australia; and it is rather a singular circumstance that the kangaroo, an animal which was long supposed to be peculiar to Australia, is found both on the Arru islands and on the southern part of New Guinea; and as no specimens have been met with on the northern coasts of the latter island by Forrest and the French navigators who have been there, it seems to exist only on the portion included by the Great Australian Bank.*

* As the circumstance of kangaroos existing in New Guinea and Arru is not generally known, I will here give the authorities on which it rests. The kangaroo was first discovered in New Guinea, in the year 1828, by an expedition sent from Amboyna to explore the S.W. coast, and to found a settlement there. M. Modera, the historian of the voyage, states (p. 124) that they met with several sorts of kangaroos (*vele soorten van kangoeroes of Springhazen*), which, with an animal he calls the "koeskoes," were the only quadrupeds met with. I am informed that a specimen, or specimens of the kangaroos seen during this expedition, will be found in the museum at Leyden. Lieut. Kolff, of the Dutch navy, was the first who met with the kangaroo at the Arru Islands, but he does not appear to have known what it was. His description is as follows:—"I cannot avoid giving a description of the Pilandok or Arru rabbit, an animal rather larger than the common rabbit, of a grey colour, which, as they grow older, becomes quite grizzly. The fore legs are short; and the hind ones, which resemble those of the hare, have each three toes, provided with strong nails; the head is like that of a weazole. These animals do not run very fast, and when resting they

New Guinea.—The northern part of this island, that is to say the portion lying to the N. and N.W. of the range of mountains already alluded to, partakes of the rugged and broken character of the volcanic islands of the Indian Archipelago, but the south-western part is low and undulating, and we may conclude that it bears a considerable resemblance to the northern coasts of Australia, since the several Dutch navigators who explored the Gulf of Carpentaria, and who were in the habit of coasting this part of New Guinea on their way to Australia, considered them as being portions of the same continent, and they were thus delineated in our maps until Cook passed through Torres Strait and decided the question as to their insularity. A very interesting account of the S.W. coast of New Guinea is given in Modera's "Narrative of the Voyage of the Dutch Corvette 'Triton' in the year 1828," when this coast was explored with a view to forming a settlement; and as it contains information which bears upon this point I would willingly make some extracts, were they not of too great length to be inserted in a paper of so general a nature as this must necessarily be.

The Arru Islands.—This group of islands is situated on the northern verge of the Great Australian Bank, and extend from N. to S. about 100 miles; but as the eastern side of the group has not been explored, its limits in that direction are uncertain. Some of the southern islands are of considerable extent, but those to the N., lying close to the edge of the bank, are rarely more than 5 or 6 miles in circumference. The land is low, being only a few feet above the level of the sea, except in spots where patches of rock rise to the height of about 20 feet, but the lofty trees which cover the face of the country give it the appearance of being much more elevated. Coral reefs extend from the shores of all the islands, and in the eastern parts of the group these are often of great extent. The islands are divided from each other by narrow channels, some of which are of great depth, and in one of these there is said to be a whirlpool of so formidable a description that the natives will not venture to approach it even in their larger vessels. I regret that during my recent visit to these islands my time was so much occupied by inquiries connected

usually sit upright on their hind legs. Their food consists of the leaves of the yam plant and other greens; and they are easily tamed, when they may be suffered to run around the house without their attempting to escape. The flavour of their flesh is very agreeable."—*Voyage of the Dourga (English Translation)*, p. 198.

I was not so fortunate as to meet with any during my visit to the Arru Islands, but from the skin of one that I saw, I judged it to resemble the smaller kind of kangaroo met with on the north coast of Australia; and this opinion was confirmed by a gentleman well acquainted with the Arru Islands, and who was enabled to make the comparison from having also seen the kangaroos of Port Essington.

with the expedition to which I was attached, that I could not ascertain this fact from personal observation. Upon the whole, it is evident that this group has not been left quite untouched by the convulsion which has shaken its neighbours, a circumstance that might naturally be expected from its position on the very edge of the bank, and in the close vicinity of the volcanic chain, the Great Ki Island being only 60 miles distant.

When it is taken into consideration that the primary mountain ranges both in south-eastern Asia and in Australia pursue a precisely similar direction, and that the westernmost Asiatic range, if continued, would strike about the N.W. Cape where the western Australian range commences, while banks extending from both these continents actually approach to within 450 miles of each other, the question naturally arises as to whether these continents were ever united. This inquiry, however, would lead to details of too extensive a nature to be admissible in a paper of this description, and which would belong rather to geology than geography, but it is well deserving of being followed up, since it possesses an interest beyond that which attaches to geographical matters generally; for if it is found that the mountain ranges of Australia are a continuation of those of eastern Asia, we may expect that they will also afford the mineral wealth for which the latter are so celebrated. Our colonies in Australia are now in a condition which would render the discovery of valuable minerals of the very highest importance. The amount of agricultural produce raised in these colonies is considerably above that required for the consumption of the inhabitants, who are now anxiously looking about the world for a market for their surplus produce, and such a market would be afforded by a population employed in mining operations. We may reasonably expect that mineral wealth is not confined to the district of South Australia. The great range extending the entire length of the N.E. coast is of a very promising description, as is also the range which abuts on the N. coast near the new settlement at Port Essington, and which, if it preserves the same direction which is observed in the other Australian ranges, may be connected with that of South Australia. The Liverpool, Adelaide, and Alligator rivers, the largest yet discovered in Australia, appear to have their sources in this range.

In conclusion, I will venture to suggest that the great banks alluded to in this paper might be introduced into our maps of the Indian Archipelago with very good effect, and if delineated by means of the dotted lines, as in the accompanying outline map, would rather improve their appearance than otherwise, while at the same time they would tend to illustrate to a certain degree the

geological character of these countries. We have ample data from which to define their limits, except at the single point to which I have alluded in this paper, with regard to the S.W. extremity of Celebes.

IV.—*On the Languages of Australia, being an extract of a Dispatch from Captain G. GREY, Governor of South Australia, to Lord Stanley. Communicated by his Lordship.*

I HAVE the honour to transmit to your Lordship an outline map of the continent of Australia, coloured so as to show the districts within which different dialects are spoken on that portion of the southern coast which lies between 115° and 141° E.

Five principal dialects are spoken within this range.

The first is spoken within the district comprehended between the 115th and 125th meridian.*

The second dialect is spoken by the aborigines inhabiting the district lying between 125° and 136° E. This dialect is composed, in a great measure, of the languages which I have, in this dispatch, termed the first and third dialects, and which are spoken by the natives of Western Australia and those of the vicinity of Adelaide respectively.

The third dialect is that spoken by the natives inhabiting the vicinity of Adelaide and the country to the north of it, as far as it has yet been explored.

The fourth dialect is spoken by the tribes inhabiting the banks of the river Murray, as far southward as a point about 30 miles to the north of the junction of that river with Lake Alexandrina; and it extends thence to the northward along the Murray until its junction with the Darling, and from thence to the northward along the latter river as far as we have any acquaintance with its aboriginal tribes. No extensive vocabulary of this dialect has yet been collected, but I trust that in a few months I shall be able to forward one to your Lordship, as two gentlemen are at present engaged on this subject.

The fifth dialect is spoken by the aboriginal tribes inhabiting the shores of Lake Alexandrina, and it extends thence to the northward for about 30 miles along the banks of the Murray, and to the southward and eastward along the coast of Australia in the direction of Port Philip, to as great a distance as we are yet acquainted with the natives. I have on the present occasion

* Vocabularies of this and the two following dialects were previously sent home by Gov. Grey.—ED.